

APPENDIX E

POST-CONSTRUCTION MONITORING PROGRAM

I. Purpose and Scope

No later than one year from Date of Entry, MSD shall submit to EPA and the State for review and for EPA's approval, with a copy to the Coalition, a plan for a Post-Construction Monitoring Program ("PCMP") that (1) demonstrates whether MSD has achieved the Performance Criteria for each CSO Control Measure set forth in Appendix D and (2) assesses and documents the impacts on receiving water quality that result from the implementation of the CSO Control Measures. MSD shall implement the PCMP upon receipt of EPA's written approval of the PCMP Plan. During implementation of the CSO Control Measures, MSD shall not reroute any flows in the Sewer System for the purpose of meeting the Performance Criteria other than those measures consistent with the Long Term Control Plan ("LTCP") or as otherwise approved in writing by EPA.

The PCMP shall include the following elements:

- Actions to evaluate and document the effectiveness of each CSO Control Measure set forth in Appendix D;
- Actions to assess and document the environmental benefits attributable to CSO Control Measures;
- A Water Quality Monitoring Plan that details the monitoring schedule, sampling locations, and monitoring procedures to collect data related to the Performance Criteria and the impacts from CSOs on receiving water quality;
- Updates and enhancement of the collection system computer models; and
- Mechanisms for providing public education and information on the need for implementation of the CSO Control Measures, any water quality improvements, and the progress made in achieving the Performance Criteria.

II. Performance Monitoring and Sampling

MSD shall conduct performance monitoring and sampling in order to demonstrate that the Performance Criteria for each CSO Control Measure has been satisfied. The monitoring and sampling data must enable comparison of post-construction conditions with baseline conditions determined during the development of the LTCP.

MSD shall initiate long-term monitoring of the performance of major constructed facilities upon Achievement of Full Operation of each facility and long-term monitoring of the receiving streams. Major constructed facilities, identified in Appendix D, include pumping station improvements, wet weather storage tanks and conveyance/storage tunnels, expansions and upgrades of existing wastewater treatment facilities, and any approved Enhanced High Rate Treatment facilities planned for the CSS. Long-term monitoring of water quality in the receiving streams must be performed in accordance with the Water Quality Monitoring Plan described below.

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MSD shall periodically evaluate the data it collects in order to document its compliance with the Performance Criteria. Based on such evaluations, MSD may propose modifications of the PCMP to EPA, and shall make such modifications to the PCMP once approved by EPA in writing.

MSD has established its baseline collection system conditions through flow and activation monitoring of selected CSO outfalls. MSD shall perform post-construction flow monitoring at approved locations to support analyses demonstrating compliance with the Performance Criteria for each CSO Control Measure.

Locations to be monitored in the Lemay service area include Outfall 063 and other outfalls that collectively represent a minimum of 75 percent of the overflow volume in the typical year, and major components of the CSO Control Measures including pump stations, conveyance/storage tunnels and treatment facilities. Locations to be monitored in the Bissell Point service area include remaining CSO outfalls to Maline Creek, and major components of the CSO Control Measures including pump stations, storage tanks and treatment facilities.

MSD will select monitoring locations that specifically provide system operational and flow data for calibrating the updated hydraulic models that include the constructed CSO Control Measures, and locations that provide data for evaluating CSO Control Measure performance. Specific locations to be monitored will be identified in the detailed monitoring plans to be developed for the CSO Control Measures as described below.

The data shall also support:

- Characterization of sewer flow for evaluation of long-term collection system performance.
- Collection of information on overflows at CSOs including overflow volume and duration.
- Development of a database of flow data for use in future design efforts related to controlling CSOs.
- Enhanced operation and maintenance actions to further control wet weather discharges and achieve NPDES permit compliance.
- Demonstration of maximum treatable flow rate through each treatment step following the secondary treatment upgrade at Lemay (stress test).

Performance monitoring of each CSO Control Measure shall commence within six months of Achievement of Full Operation of that CSO Control Measure.

MSD shall submit to EPA and the State for review and for EPA's approval, with a copy to the Coalition, a detailed monitoring plan for each of the following CSO Control Measures one year prior to the applicable Achievement of Full Operation date set forth in Appendix D:

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Maline Creek:

- Enhanced High Rate Treatment unit at Outfall 051
- Storage Tank at Outfall 052

Gingras Creek:

- Relocation of Outfall 059

Upper River Des Peres:

- Storage tunnel to store flows from CSO outfalls to the Upper River Des Peres

River Des Peres Tributaries:

- Tunnel to convey/store flows to Lemay WWTF

Lower and Middle River Des Peres:

- Flow storage in 29-ft horseshoe sewers under Forest Park
- Enhanced High Rate treatment unit near Outfall 063
- Removal of secondary treatment bottlenecks at WWTF
- Tunnel to convey/store flows to Lemay WWTF

Following Achievement of Full Operation of each CSO Control Measure listed in Appendix D, MSD shall conduct activation monitoring at all CSO outfalls addressed by that particular CSO Control Measure to determine the number of activation events at each CSO outfall, and submit the activation information in the Annual Report as set forth in Section VIII of the Consent Decree. Such activation information shall be submitted as an actual number of events.

III. Stress Testing of Lemay Treatment Plant

MSD shall construct the CSO Control Measure in accordance with the description, design criteria, performance criteria, and critical milestones contained in Appendix D to achieve a minimum secondary treatment design capacity of 210 million gallons per day (MGD) at the Lemay Treatment Plant. The existing preliminary and primary treatment facilities have a design capacity of 340 MGD. Effluent disinfection facilities are currently being designed with a capacity of 340 MGD.

MSD shall submit a stress test protocol to EPA and the State for review and for EPA's approval, with a copy to the Coalition, at least 30 days prior to Achievement of Full Operation of the upgraded wastewater treatment facilities. The protocol shall be designed to determine the maximum treatable wet-weather flow rates for each treatment step (preliminary, primary, secondary, and disinfection) at the Lemay Treatment Plant following the completion of the upgrades described above. EPA/MDNR shall review the stress test protocol pursuant to Section VII of this Consent Decree (Review and Approval Procedures).

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In accordance with that review, and by no later than 365 days after the Achievement of Full Operation of the treatment plant upgrades, MSD shall conduct the approved stress test. The stress test shall be performed to confirm that the peak wet-weather flow capacity of the preliminary treatment, primary treatment, and disinfection facilities is 340 MGD or higher, and that the peak wet-weather flow capacity of the secondary treatment facilities is 210 MGD or higher.

MSD shall submit the results of the stress test to EPA and the State for review and for EPA's approval, with a copy to the Coalition, by no later than 400 days after Achievement of Full Operation of the treatment plant upgrades. The results shall include the maximum treatable wet-weather flow rates for each treatment step (preliminary, primary, secondary, and disinfection). EPA/MDNR shall review the stress test results pursuant to Section VII of this Consent Decree (Review and Approval Procedures). Within 60 days after approval of the stress test results, MSD shall submit an application to modify its operating permit to include the approved maximum treatable wet-weather flow rates for each treatment step. Upon issuance of all necessary operating permit modifications, MSD shall operate the Lemay Treatment Plant in accordance with such maximum treatable wet-weather flow rates for each treatment step. MSD shall conduct post-construction monitoring of treatment plant performance to verify the suitability of the approved stress test results.

IV. Water Quality Monitoring Plan

No later than one year from the Date of Entry, MSD shall submit a Water Quality Monitoring Plan ("WQMP") to EPA and the State for review and for EPA's approval, with a copy to the Coalition. Sampling locations for receiving waters shall include at a minimum the sites used during the development of the LTCP. Data collected by the U.S. Geological Survey, Missouri Department of Natural Resources, Illinois Environment Protection Agency, or other agencies may be utilized for this monitoring if the data are considered by MSD to be of acceptable quality.

The WQMP, at a minimum, shall:

- Further characterize baseline water quality conditions prior to development and implementation of the CSO Control Measures set forth in Appendix D;
- Measure changes in water quality during and after implementation of the CSO Control Measures; and
- Assess the impacts of CSOs on the water quality of the receiving stream remaining after the Achievement of Full Operation of each CSO Control Measure.

The WQMP shall define the anticipated schedule for monitoring at each sampling location. MSD shall conduct field measurements and collect water quality samples at the approved sampling locations once every two weeks for all parameters except *E. coli* which shall be collected once every two weeks during the recreation season. Monitoring shall begin within ninety (90) days of EPA's approval of the PCMP and will be conducted at approximately the same time of day, on the same day of the week, at each location, to obtain an appropriate representation of storm event and non-event conditions. Monitoring shall not be delayed because of weather, except for safety

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reasons. The monitoring frequency shall provide data sufficient to calculate a geometric mean *E. coli* concentration consistent with applicable water quality standards and for tracking long term trends.

MSD shall record field measurements for temperature, pH, and dissolved oxygen at each site. Field observations shall also be recorded for floating debris, submerged debris, algal growth/blooms, odor, and recreational use. Samples shall be collected and analyzed for, at a minimum, *E. coli*. Samples from receiving waters other than the Mississippi River shall also be analyzed for, at a minimum, BOD, ammonia, and total suspended solids.

At least 6 months prior to submitting the WQMP, MSD shall submit to EPA and the State for review and for MDNR's approval, with a copy to the Coalition, the Quality Assurance Project Plan (QAPP) to be used in the monitoring plan. The QAPP shall be developed based on the guidance in the following documents:

- United States Environmental Protection Agency (EPA), December 2002. Guidance for Quality Assurance Projects Plans, EPA QA/G-5, Washington, DC.
- United States Environmental Protection Agency (EPA), November 2002. Guidance on Environmental Data Verification and Data Validation, EPA QA/G-8, Washington, DC.

For data collected by the U.S. Geological Survey, Missouri Department of Natural Resources, Illinois Environment Protection Agency, or other agencies, MSD shall submit the applicable agency's QAPP (e.g., Quality-Assurance Plan for Surface-Water Activities of the U.S. Geological Survey, Missouri Water Science Center, October 2007) for MDNR review before that agency's data may be utilized in the monitoring program.

V. Rainfall Monitoring

MSD shall include rainfall monitoring as an essential component of the PCMP. Detailed analysis of precipitation is necessary to update MSD's hydraulic model as construction activities proceed to fully evaluate compliance with the Performance Criteria. Precipitation data shall consist of total rainfall depth, duration, intensity, and event distribution.

Rainfall data shall be compiled and analyzed as part of the PCMP. The source of rainfall data is MSD's network of long-term rain gauges spaced throughout MSD's service area. Rainfall data collected by MSD shall be used for analysis in connection with other post-construction monitoring data.

VI. Data Management

MSD shall use a Data Management System and associated protocols for the storage, management, retrieval, and analysis of all data used to assess the performance of MSD's CSO Control Measures.

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VII. Quality Control

Quality control and quality assurance procedures and protocols prepared as part of the development of the LTCP must continue to be used for the implementation of the PCMP. MSD shall update the quality control and quality assurance procedures and protocols from time to time as appropriate. All monitoring plans shall incorporate the procedures and protocols available at the time of submittal.

VIII. Analysis, Progress Reporting, and Compliance Demonstration

MSD shall use the data from the PCMP to evaluate the performance and effectiveness of each CSO Control Measure in complying with the Performance Criteria set forth in Appendix D.

Data from the PCMP shall be used to update and improve calibration and verification of MSD's collection system models. The updated collection system models will be used to demonstrate compliance with Performance Criteria as set forth in Appendix D using the 2000 design year used in development of the LTCP. At this juncture, it is assumed that accepted engineering practice at the time the Post-Construction Monitoring Program is conducted will still rely on a hydraulic model similar to those in use today. In the event that accepted practice at the time the Post-Construction Monitoring Program is conducted has changed, MSD will submit an alternate method for approval.

MSD shall report the results and progress of the PCMP in the Annual Report as set forth in Section VIII of the Consent Decree. This progress report shall include a summary of CSS Watershed performance to-date, consisting of:

- CSO activation and flow monitoring data;
- Rainfall data;
- Receiving water monitoring results;
- Status in achieving the Performance Criteria for each CSO Control Measure;
- Updating of collection system hydraulic models to reflect implemented CSO Control Measures. Necessary model modifications, recalibration, and reverification will be indicated and documented;
- Identification and documentation of CSO Control Measure deficiencies and performance limitations; and
- Identification and documentation of any proposed supplemental remedial CSO Control Measures.